

- Goals**
- Find the circumference of a circle and the length of a circular arc.
  - Use circumference and arc length to solve problems.

## VOCABULARY

Circumference

Arc length

## THEOREM 11.6: CIRCUMFERENCE OF A CIRCLE

The circumference  $C$  of a circle is  $C = \pi d$  or  $C = 2\pi r$ , where  $d$  is the diameter of the circle and  $r$  is the radius of the circle.

### Example 1 Using Circumference

- Find the circumference of a circle with radius 9 inches.
- Find the diameter of a circle with a circumference of 58 inches.

#### Solution

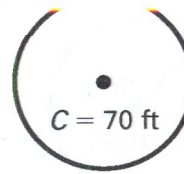
$$\begin{aligned} \text{a. } C &= 2\pi r \\ &= 2 \cdot \pi \cdot 9 \\ &= 18\pi \\ &\approx 56.5 \end{aligned}$$

So, the circumference is about 56.5 inches.

$$\begin{aligned} \text{b. } C &= \pi d \\ 58 &= \pi d \\ \frac{58}{\pi} &= d \end{aligned}$$

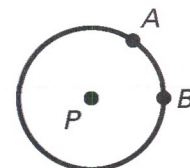
$\approx 18.5$   
So, the diameter is about 18.5 inches.

✓ **Checkpoint** Find the indicated measure.



**ARC LENGTH COROLLARY**

In a circle, the ratio of the length of a given arc to the circumference is equal to the ratio of the measure of the arc to  $360^\circ$ .

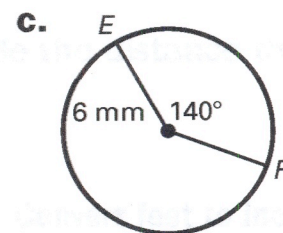
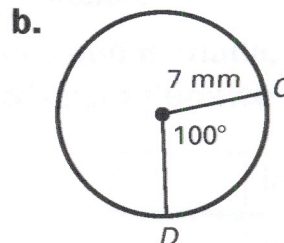
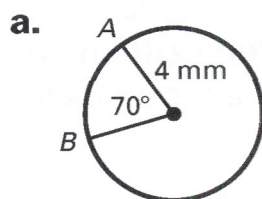


$$\frac{\text{Arc length of } \widehat{AB}}{\boxed{\phantom{000}}} = \frac{m\widehat{AB}}{\boxed{\phantom{000}}}, \text{ or}$$

$$\text{Arc length of } \widehat{AB} = \frac{m\widehat{AB}}{\boxed{\phantom{000}}} \cdot \underline{\hspace{1cm}}$$

**Example 2** Finding Arc Lengths

Find the length of each arc.



**Solution**

a. Arc length of  $\widehat{AB} = \underline{\hspace{1cm}} \cdot 2\pi(\underline{\hspace{1cm}}) \approx \underline{\hspace{1cm}}$  millimeters

b. Arc length of  $\widehat{CD} = \underline{\hspace{1cm}} \cdot 2\pi(\underline{\hspace{1cm}}) \approx \underline{\hspace{1cm}}$  millimeters

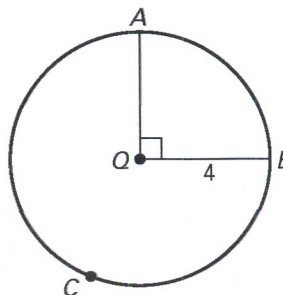
c. Arc length of  $\widehat{EF} = \underline{\hspace{1cm}} \cdot 2\pi(\underline{\hspace{1cm}}) \approx \underline{\hspace{1cm}}$  millimeters

# Practice A

For use with pages 683–689

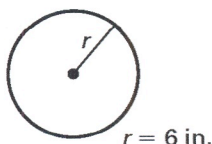
Match the measure with its value.

- |                                      |               |
|--------------------------------------|---------------|
| 1. $m\widehat{AB}$                   | A. $2\pi$     |
| 2. Diameter of $\odot Q$             | B. $8\pi$     |
| 3. Length of $\widehat{ACB}$         | C. $6\pi$     |
| 4. Circumference of $\odot Q$        | D. 8          |
| 5. Length of $\widehat{AB}$          | E. $4\pi$     |
| 6. Length of semicircle of $\odot Q$ | F. $90^\circ$ |

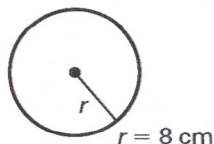


Find the indicated measure.

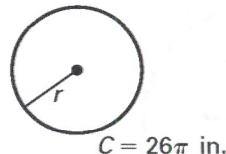
7. Circumference



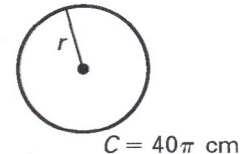
8. Circumference



9. Radius

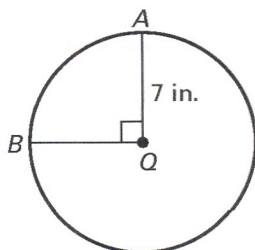


10. Radius

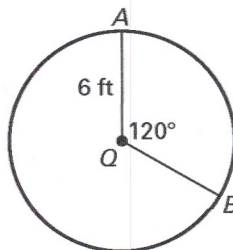


Find the length of  $\widehat{AB}$ .

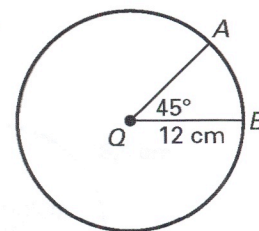
11.



12.



13.



Determine the distance in feet that the vehicle would travel with (a) two revolutions of the tire, and (b) ten revolutions of the tire.

14. Tractor-trailer tire:  $d = 36$  in.

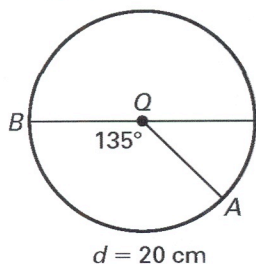
15. Mountain bike tire:  $d = 28$  in.

16. All terrain vehicle tire:  $d = 20$  in.

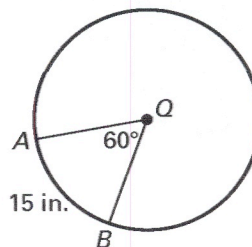
17. Train engine wheel:  $d = 56$  in.

Find the indicated measure.

18. Length of  $\widehat{AB}$



19. Circumference



20. Radius

